UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
OSB2000-0017

February 29, 2000

Ms. Mona Ellison
Rural Development
101 SW Main St.
Suite 1410
Portland, OR 97204-3222

Re: Consultation for the City of Oakland's Proposed Wastewater System Improvements on Calapooya Creek, Douglas County, Oregon

Dear Ms. Ellison:

This concludes our correspondence regarding the effects on Umpqua River (UR) cutthroat trout and Oregon Coast (OC) coho salmon from Rural Development's (RD) proposed role in funding wastewater system improvements for the city of Oakland, Oregon (City) in Douglas County, Oregon. The City proposes to modify the wastewater treatment facility by eliminating effluent discharge into Calapooya Creek during low flow periods.

The UR cutthroat was listed by the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA) as endangered on August 9, 1996 (61 FR 41514). Critical habitat for UR cutthroat was designated by the NMFS on January 9, 1998 (63 FR 1338). OC coho was listed by the NMFS under the ESA as threatened on August 10, 1998 (63 FR 42587), with an effective listing date of October 9, 1998; critical habitat for OC coho was proposed on May 10, 1999 (64 FR 24998). NMFS determined that OC steelhead did not warrant listing under the ESA on March 19, 1998 (63 FR 13347). All three species of anadromous salmonids described above occur in Calapooya Creek. This consultation is undertaken pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR Part 402.

In a letter dated March 18, 1999, RD requested formal consultation and provided a biological assessment (BA) on the effects of a wastewater treatment system improvement project for the City. RD attached an addendum to the wastewater

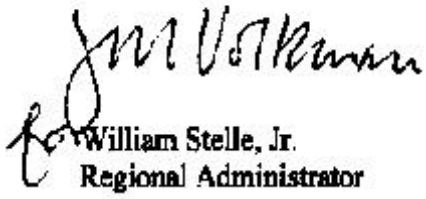
treatment plant BA to a letter dated April 29, 1999. The City's consultant provided additional information on projects with similar impacts to the proposed action in an attachment to a letter dated June 28, 1999.

Enclosed is the Biological Opinion on RD's role in financing the proposed modifications to the City's wastewater treatment facility and authorizing the incidental take of UR cutthroat and OC coho salmon that may be caused by this action provided that the terms and conditions of the incidental take statement are met. This Biological Opinion analyzes the effects of both the construction and operation of the proposed modifications on ESA-listed anadromous fish species, and may adequately address the project-specific obligations of the U.S. Army Corps of Engineers and other Federal agencies under section 7 of the ESA. The attached document also serves as a Conference Opinion on the effects of the actions on OC steelhead.

Although NMFS expects some effects to individual fish and their habitat from these actions, the effects to essential features of UR cutthroat trout, OC coho salmon, OC steelhead habitat are expected to be minor because of project design and location. Adverse effects to individuals of these species are expected to be rare because of project design, location, and reasonable and prudent measures to be taken by the City.

Questions should be directed to Dan Kenney, Fishery Biologist, Oregon State Branch Office at (541) 957-3385.

Sincerely,



William Stelle, Jr.
Regional Administrator

cc: Dave Loomis, Oregon Department of Fish and Wildlife
Steve Wille, U.S. Fish and Wildlife Service
Paul Tamm, City of Oakland
Pete Dalke, Oregon Department of Environmental Quality

Endangered Species Act - Section 7
Consultation

BIOLOGICAL and CONFERENCE OPINION

Effects of Modifications to a Wastewater System on Calapooya Creek on Umpqua River Cutthroat Trout, Oregon Coast Coho Salmon, and Oregon Coast Steelhead

Agency: Rural Development

Consultation Conducted By: National Marine Fisheries Service, Northwest Region

Date Issued: February 29, 2000

Refer to: OSB2000-0017

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I. BACKGROUND

The Umpqua River (UR) cutthroat trout (*Oncorhynchus clarki clarki*) was listed as endangered under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS) on August 9, 1996 (61 FR 41514). Critical habitat for this species was designated on January 9, 1998 (63 FR 1388). On April 5, 1999, the NMFS proposed to reclassify UR cutthroat trout as a candidate species because recent genetic studies have shown that the Umpqua River evolutionarily significant unit (ESU) is likely a portion of a larger Oregon Coast (OC) cutthroat trout ESU which is not thought to be in danger of extinction (64 FR 16397). UR cutthroat trout, however, will remain listed as *endangered* until a final rule is published, at which time ESA jurisdiction for this species will be assumed by the U.S. Fish and Wildlife Service. The NMFS listed the OC coho salmon (*Oncorhynchus kisutch*) ESU as threatened under the Endangered Species Act (ESA) on August 10, 1998 (63 FR 42587); critical habitat for this ESU was proposed on May 10, 1999 (64 FR 24998). On March 19, 1998 (63 FR 13347), the NMFS determined that the OC steelhead ESU did not warrant listing under the ESA, but considers the ESU to be a candidate species. All three species of anadromous salmonids described above occur in Calapooya Creek, Douglas County, Oregon.

In a letter dated March 18, 1999, the United States Department of Agriculture, Rural Development (RD) requested formal consultation and provided a biological assessment (BA) on the effects of a wastewater treatment system improvement project for the City of Oakland (City), in Douglas County, Oregon. RD anticipated participation in the Federal/State funding agreement for the project. The City currently discharges treated effluent into Calapooya Creek year-round, a practice that is believed to degrade water quality in the creek, especially during low-flow periods (late spring, summer, and early autumn). The City is proposing to use the effluent to irrigate and fertilize pasture grass, which would require the construction of a pipeline to transport the effluent to the crop. The proposal includes a pipeline crossing of Calapooya Creek. RD attached an addendum to the BA to a letter dated April 29, 1999. The City's consultant provided additional information on a similar project attached to a letter dated June 28, 1999.

The objective of this BO is to determine whether the activities proposed by the City are likely to jeopardize the continued existence of UR cutthroat trout, OC coho salmon, or result in destruction or adverse modification of designated and proposed critical habitat for these species. In addition, this document is a conference opinion on the effects of the proposed activities on OC steelhead and its habitat. This biological opinion (BO) is also intended to address other Federal actions associated with the proposed project, such as any U.S. Army Corps of Engineers or Environmental Protection Agency permitting.

II. PROPOSED ACTION

The proposed action is the possible award of grants and loans by RD to the City to fund the wastewater treatment system improvement (WW) project. The grants would allow the City to plan, construct, and as an interrelated action, operate the WW project.

The City has proposed to construct and operate the WW project to avoid discharge of effluent into Calapooya Creek during low flow periods in the creek. This is because the flow volume in the subject reach of Calapooya Creek is insufficient to meet Oregon Department of Environmental Quality (ODEQ) and National Pollution Discharge and Elimination System regulations for effluent dilution during much of each summer and early fall. Under current conditions, the effluent is contributing to increased Biological Oxygen Demand (BOD), water temperatures, pH, fecal coliform, and decreased dissolved oxygen (DO) in Calapooya Creek—which has been designated by ODEQ as water quality-limited for the above-named factors. Furthermore, the City must eliminate effluent discharge under a Mutual Agreement and Order (MAO) with the ODEQ. To meet the MAO stipulations, the effluent would have to be used in a consumptive manner and/or held until flows in the creek increase to allow adequate dilution, specifically during the dry season (June 1 through October 31). To this end, the City is designing a WW system that would irrigate enough pasture grass (about 40 acres) to ensure that evapotranspiration by the grass would prevent the effluent from seeping into the groundwater system. To compensate for the decline in the consumption of water by the grass in the fall, prior to substantial rainfall and the concomitant rise in Calapooya Creek flows, the City is also proposing to construct a 4-6 acre holding pond on the same site as the irrigated pasture.

The proposed WW project would involve the construction of a 10-inch diameter buried pipeline to transport treated effluent from the existing WW treatment plant to a site approximately 2,200 feet to the west of the WW treatment plant. To take advantage of existing road rights-of-way, the pipeline would not be extended directly to the pasture and holding pond site, and so would extend a total of about 5,000 feet. This route would require a crossing of Calapooya Creek at about creek mile 13.7. The crossing of Calapooya Creek would require the excavation of a trench, about 4 to 5 feet in depth and 3 to 5 feet in width, in the streambed (likely 100 feet or less in width at the site) and possible removal of some woody riparian vegetation.

Because the City has not yet collected funds to fully plan the WW project, the exact location and characteristics of the proposed Calapooya Creek pipeline crossing have not yet been fully developed, but the excavation of the creek crossing in the bedrock streambed is likely to require the use of explosives. During construction activities, one or more cofferdams would be constructed to dewater and isolate the excavation area from the rest of the creek. The pipeline would be bedded and backfilled, and the top of the trench capped with creek cobbles embedded in concrete. The construction of the creek crossing would occur during the Oregon Department of Fish and Wildlife's (ODFW) in-water work window of June 15 through September 15.

The City's WW treatment plant currently treats about 74,000 gallons per day (gpd), or 0.12 cubic feet per second (cfs) as a daily mean during the dry season, although the peak daily flow measured during the dry season was 185,000 gpd (about 0.3 cfs). The plant's peak daily capacity is roughly 634,000 gpd (about 1 cfs), but high treatment volume usually occurs during the winter and spring, when flows in the subject reach of Calapooya Creek are also high. The City's consultant estimates that, based on projected population growth in the City, the daily dry weather mean effluent production would be about 148,000 gpd (about 0.23 cfs) in 2020.

III. BIOLOGICAL INFORMATION AND CRITICAL HABITAT

The Calapooya Creek watershed and the Umpqua River basin support runs of UR cutthroat trout, OC coho salmon, and OC steelhead. NMFS (1997), Johnson *et al*. (1994), Weitkamp *et al*. (1995), and Busby *et al*. (1996), provide detailed information on the life history, distribution, and abundance of these species, but some site specific information is provided below.

The UR cutthroat trout ESU consists of resident, potamodromous, and anadromous life histories. Individuals of all three forms have the potential to inhabit Calapooya Creek in the vicinity of the City. Spawning by UR cutthroat is unlikely to occur in Calapooya Creek in the vicinity of the City because the individuals of this ESU typically spawn in small tributary streams. Historically, adult anadromous cutthroat trout passed Winchester Dam (on the North Umpqua River) predominantly from late June through November, with peaks in mid-July and mid-October, while juvenile outmigration is thought to occur chiefly from March through October (Johnson *et al*. 1994). Adult migration patterns in Calapooya Creek and its tributaries are not known, but Trotter (1997) reports that adult sea-run cutthroat trout have been documented migrating into streams from July through March. A smolt trap operated near the mouth of Calapooya Creek captured juvenile cutthroat trout (some of which were smolted) from early March through the third week of June 1998, with peak collection in mid-April (Elijah Waters, Fishery Biologist, Bureau of Land Management, pers. comm., Jan. 14, 1999). It is likely that the stream reach is used as a rearing and feeding area by both adults and juvenile UR cutthroat trout year-round or nearly so, although low flows and warm water temperatures in the subject reach are likely to adversely affect the suitability of this reach during the late summer and early fall. Such conditions are typical for low elevation streams of substantial size in Douglas County. In Calapooya Creek this situation is likely due to a combination of natural conditions and the effects of water withdrawals for irrigation and municipal use.

OC coho salmon are an anadromous species which typically have a three-year life-cycle. Adults spawn in the late fall and winter, with fry emergence occurring the following spring. Juvenile coho salmon rear for about a year in natal streams, and then outmigrate to the ocean as smolts in the spring. A smolt trap operated near the mouth of Calapooya Creek captured coho salmon smolts from early March through mid-May 1998, with peak collection in mid-April (Elijah Waters, Bureau of Land Management, pers. comm., Jan. 14, 1999). Some male coho return to freshwater to spawn the fall and

winter of the same year as their smolt migration, but the majority of adult OC coho salmon do not return to spawn until having spent about 18 months in the ocean. Adult coho typically enter Calapooya Creek for spawning from November into January, but, similar to UR cutthroat trout, the subject reach does not provide suitable spawning habitat. It is possible that the subject reach of Calapooya Creek provides some feeding and rearing habitat for juvenile OC coho salmon (see discussion under UR cutthroat trout, above), but it is likely that the main use of the subject reach by OC coho salmon is as a migration corridor for adults and outmigrating juveniles (smolts).

OC steelhead may exhibit anadromy or freshwater residency. Resident forms are usually referred to as "rainbow trout", while anadromous life forms are termed "steelhead;" both forms likely occur in the Calapooya Creek watershed. Steelhead typically migrate to marine waters as smolts in the spring after spending two years in freshwater. They then reside in marine waters for 2 to 3 years prior to returning to their natal stream to spawn as 4- or 5-year-olds. A smolt trap operated near the mouth of Calapooya Creek captured steelhead smolts from early March through mid-May in 1998, with peak collection in late April (Chuck Wheeler, Fishery Biologist, Bureau of Land Management, pers. comm., Oct. 8, 1999). Most or all adult steelhead in the mainstem Umpqua Basin watersheds are "winter-run" and likely enter freshwater in the late fall or winter.

Unlike salmon, steelhead do not necessarily die after spawning (which would likely occur in this part of Calapooya Creek in the winter through April or May) and may survive to spawn two or more times. Unlike UR cutthroat trout and OC coho salmon, it is possible that OC steelhead spawn in the subject reach of Calapooya Creek. OC steelhead fry in Calapooya Creek would likely emerge from redds in this section of Calapooya Creek from April through early June, while older juvenile steelhead likely use the subject reach of Calapooya Creek as rearing habitat year-round or nearly so (depending on peak water temperatures).

In summary, during their annual migrations adults and smolts of all three anadromous salmonid species would likely pass through the subject reach of Calapooya Creek. During at least a portion of the typical summer in-water construction period, it is likely that the reach provides rearing habitat for juveniles of all three species, especially cutthroat trout and steelhead, and adult UR cutthroat may also be present. It is likely that the subject reach provides spawning habitat only for OC steelhead. Essential features of the migratory and rearing habitat for adults and juveniles of all three species are: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (juvenile only), (8) riparian vegetation, (9) space, and (10) safe passage conditions. The proposed project has the potential to affect all 10 of these essential features, and also has the potential to inflict injury and/or mortality to individuals of all three species.

IV. EVALUATING PROPOSED ACTIONS

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by 50 C.F.R. Part 402 (the consultation regulations). NMFS must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat.

This analysis involves the initial steps of (1) defining the biological requirements and current status of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NMFS must consider the estimated level of mortality attributable to (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmonid's life stages that occur beyond the action area. If NMFS finds that the action is likely to jeopardize, NMFS must identify reasonable and prudent alternatives to the action.

Furthermore, NMFS evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' proposed or designated critical habitat. NMFS must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. NMFS identifies those effects of the action that impair the function of any essential element of critical habitat. NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent measures available.

For the proposed action, NMFS' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NMFS' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for adult and juvenile migration of the listed salmonids under the existing environmental baseline.

A. Biological Requirements and Current Status

The first step in the method NMFS uses for applying the ESA standards of section 7 (a)(2) to listed salmonids is to determine the species' biological requirements that are most relevant to each consultation. NMFS also considers the current status of the listed species taking into account population size, trends, distribution, and genetic diversity.

To assess the current status of the listed species, NMFS starts with the documents used to make its determinations to list the particular species for ESA protection, and also considers new data available that is relevant to those determinations (see references in Sections I and III).

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally reproducing population levels at which protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stocks, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

For this consultation, the biological requirements of UR cutthroat trout, OC coho salmon, and OC steelhead are increased migration and rearing survival and improved habitat characteristics that function to support successful migration and rearing. The current status of the affected listed species (UR cutthroat trout and OC coho salmon), based upon its risk of extinction, has not significantly improved since this species was listed. The status of OC steelhead has also not significantly changed since its "not warranted" determinations were made.

B. Environmental Baseline

The biological requirements of the listed species are not currently being met under the environmental baseline. Its status is such that there must be a significant improvement in the environmental conditions they experience, including the condition of any proposed or designated critical habitat (over those currently available under the environmental baseline). Any further degradation of these conditions would have a significant impact due to the amount of risk the listed salmon presently face under the environmental baseline.

Current range-wide status of affected species under environmental baseline. NMFS described the current population status of the UR cutthroat trout, OC coho salmon, and OC steelhead in their status reviews (Johnson *et al*. 1994, Weitkamp *et al*. 1995; and Busby *et al*. 1994, respectively), and in the UR cutthroat trout final rule (August 9, 1996, 61 FR 41514), the OC coho salmon proposed and final rules (July 25, 1995, 60 FR 38011; and August 10, 1998, 63 FR 42587, respectively); and in the OC steelhead final rule (March 19, 1998, 63 FR 13367). Critical habitat for UR cutthroat was designated by the NMFS on January 9, 1998 (63 FR 1338) and was proposed for OC coho on May 10, 1999 (64 FR 24998). The recent range-wide status of these species is summarized in NMFS (1997).

Current status of affected species under environmental baseline within the action area. The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). The general action area can be defined as the Calapooya Creek watershed; this area is within critical habitat for UR cutthroat trout and proposed critical habitat for OC coho salmon.

V. ANALYSIS OF EFFECTS

A. Effects of Proposed Action

The principal potential effects of the proposed WW system improvements to UR cutthroat trout, OC coho salmon, and OC steelhead, and UR cutthroat trout and OC coho salmon critical habitat are related to the possible direct injury or mortality to individual juvenile fish or adult UR cutthroat trout because of mechanical injury from heavy equipment or manipulated materials during construction. Additionally, it is possible that fish may be killed or injured through dewatering of habitat, explosive percussion, creation of turbidity, and the introduction of toxic substances into the creek. Excavation into the stream bed and banks could also adversely alter in-stream and riparian habitat conditions. Finally, the operation of the WW system, as altered by the proposed improvements, would affect the quantity and quality of water in Calapooya Creek, especially during the summer and early fall.

1. Direct injury.

The proposed activities have the potential to directly affect individuals of the species of interest through contact with heavy equipment, manipulated rock and other materials, dewatering of habitat, and percussion from explosive bedrock excavation. The activities could also modify the quality of the water in Calapooya Creek through creation of turbidity and through the introduction of toxic substances such as green concrete and petrochemicals.

Specifically, if fish are in the vicinity of heavy equipment working in the creek channel (which would likely occur with the WW) they could come in contact with various parts of the equipment or with rock or other material that is excavated, moved, or placed with the equipment. For example, fish in the path of an excavator bucket could be struck during its deployment or retrieval, or crushed by the pressure of the bucket on substrate, or by rock used to construct a cofferdam, or captured within the bucket. Any of these scenarios would likely cause injury or death to the affected fish. Similar crushing is possible by the wheels or tracks of equipment operating within the streambed. Even without direct contact, the shadows, noise, and vibrations produced by such activities would likely disturb nearby fish, although such disturbance may not have long-term adverse effects.

It is difficult to determine the likelihood of direct injury or mortality that would be caused by the operation of heavy equipment within the creek channel, but, assuming that cofferdams (or similar structures/techniques) would be used to isolate extensive instream construction activities, it seems likely that such occurrences would be rare. Opportunities to harm fish during the construction and removal of cofferdams would still occur, as would the potential to strand fish out of water within cofferdams. As noted above, however, the shadows, noise, and vibrations associated with construction activities would likely disturb nearby fish. With the possible exception of steelhead fry, juveniles and adults of the salmonid species of concern are acutely aware of such sensory cues.

Such fish would likely vacate and/or avoid the area while such disturbance is occurring, so it is likely that few, if any, individuals would be directly injured or killed with careful in-water equipment operation.

If explosives are needed to excavate trenches or other depressions in stream-bottom bedrock, the required dewatering of such areas (through the use of cofferdams, etc.) would prevent the effective transmission of potentially lethal shockwaves into Calapooya Creek. While the vibration associated with explosions in bedrock would be transmitted through the rock and air into the water, such vibrations should do no more than briefly startle any nearby fish.

Sediment in Calapooya Creek will be mobilized (*i.e.*, transformed into turbidity) by the proposed action. In addition, some sediment and its attendant turbidity may enter Calapooya Creek because of the proposed actions. At moderate levels, turbidity has the potential to adversely affect primary and secondary productivity, and at high levels, has the potential to injure and kill adult and juvenile fish, and may also interfere with feeding (Spence *et al*. 1996). Although turbidity has some potential to directly adversely affect fish, this usually occurs in situations where no relief from the turbidity is possible. Any juvenile or adult UR cutthroat trout, juvenile OC coho salmon and OC steelhead parr in proximity of the proposed activities should have the opportunity and mobility to avoid (laterally or upstream of) what should be minor and short-term turbidity plumes created by the proposed action. Fry emergence for OC steelhead should be complete by late May, so no direct adverse effect on redds of this species is likely, although it is possible that newly-emerged OC steelhead fry in close proximity to the activities may lack sufficient mobility to avoid adverse turbidity conditions. Again, while a few individual steelhead fry may be injured by such activities, it seems likely that such adverse effects would be confined to the areas immediately below the activities.

Finally, the operation of heavy equipment, generators, etc. requires the use of fuel and lubricants which, if spilled into Calapooya Creek, could injure or kill aquatic organisms. If green concrete is used in the construction of the pipeline crossing, intake construction, or fish passage modifications at the existing diversion dam, it can be acutely toxic if not properly cured/neutralized before coming into contact with flowing water.

On the positive side, elimination of WW outfall during the dry period is expected to improve water quality by reducing the adverse effects of increased BOD and temperature, and decreased DO.

2. Instream and riparian habitat modification.

The City's actions associated with the WW system improvements would likely have few long-term adverse effects on the habitat on which UR cutthroat trout, OC coho salmon, and OC steelhead depend. When completed, the proposed WW pipeline crossing should be essentially indistinguishable from the existing stream bottom. Similarly, the riparian zone along most of this reach of Calapooya Creek is well-wooded, so the removal of a few mature trees during the WW pipeline construction

should not have any substantial effect on shading or the recruitment of large woody material. The small amount of riprap that may be use to armor the creek banks at the pipeline crossing should not have a substantial effect on either instream or riparian habitat.

In the short term, however, the proposed actions would likely have adverse effects. Specifically, the construction of cofferdams and excavation in the streambed and in the streambanks would likely introduce sediment into Calapooya Creek. In addition, riparian vegetation, including a few substantial trees, is likely to be removed or disturbed. Sediment has the potential to degrade salmonid spawning habitat and fine redeposited sediments have the potential to adversely affect primary and secondary productivity (Spence *et al*. 1996), and to reduce cover for juvenile salmonids (Bjornn and Reiser 1991). As with turbidity and contaminants, however, the City will be required to minimize sedimentation and disturbance of riparian areas and to mitigate unavoidable impacts by, for example, planting and maintaining replacement trees.

The elimination of effluent discharge to Calapooya Creek during the dry season should improve water quality in the creek (particularly dissolved oxygen concentration), which may benefit anadromous salmonids and their prey species.

3. Long-term effects on water quality and quantity.

As noted above, Calapooya Creek has been determined by ODEQ to be water quality-limited for several factors. The degradation of water quality is in large part due to the reduction in flows which occur in the summer and early fall, which are likely to be harmful to aquatic life even if other water quality parameters are adequate. The proposed action will potentially improve water quality by eliminating the discharge of WW into the creek during the dry period, but will potentially decrease water quality by reducing flows in the creek. Low streamflows have the potential to affect anadromous salmonids in several ways. At extremely low flow levels, individuals may become stranded in isolated pools where they may be more vulnerable to predation (by larger fish and terrestrial and avian predators), adverse water quality (especially high water temperature and low dissolved oxygen concentration), and even desiccation. Even when individual salmonids have access to large pools or pool and riffle reaches at low flow levels, the risk of predation and of exposure to adverse water quality conditions is likely to be elevated, and the ability of individuals to migrate to more suitable areas (tributary streams, for example) is often constrained by shallow riffle depths. In addition to direct effects on individual fish, salmonid prey species such as aquatic invertebrates are likely to experience similar types of mortality, which may affect the long-term population size and viability. While the duration of extreme low flow events may be only a few hours or days, many or most of the adverse effects associated with low streamflows are likely to be acutely harmful. On the other hand, even when individual salmonids are able to survive the adverse conditions created by low streamflows, their rate of growth and condition may be affected, which could have implications for winter survival and reproductive output.

a. Discharge Records and Withdrawal Calculations Under Current Conditions. The U.S. Geological Survey (USGS) has maintained discharge records for one active and one inactive gaging station on Calapooya Creek. Based on measurements at the inactive Nonpariel gage (at creek mile 26.7, drainage area 88.6 miles^2, period of record 1976-1988) the USGS calculates that the mean annual flow at that site is 205 cfs. Calculated mean annual flow at the active Oakland gage (actually at about Creek Mile 9.75, nearly 5 miles downstream of the City), drainage area 210 miles^2, period of record 1955-1973 and 1986-present) is 478 cfs. Despite the Oakland gage's record of more than twice the mean annual discharge as the Nonpariel gage, monthly mean flows during July, August, and September are about twice as large at the upstream site. On specific days, the difference is often much greater. For example, on the first five days of September, 1987, mean daily flow at the Nonpariel gage ranged from 6.0 to 8.1 cfs, while flows measured at the Oakland gage ranged from 0.55 cfs to 1.7 cfs. The difference between the summer and early fall flows at the two sites is likely due principally to irrigation and municipal water withdrawals, rather than subsurface flow or some other natural phenomenon, because USGS records sometimes show that flow at the Oakland gage is equal to or exceeds that of the Nonpariel gage during the summer. For example, from July 11 through 15, 1988, flow at the Oakland gage ranged from 33 to 44 cfs, while flow at the Nonpariel gage ranged from 30 to 31 cfs; from August 16 through 20, 1988, flow at the Oakland gage ranged from 9.5 to 12 cfs, while at Nonpariel flows ranged from 11 to 13 cfs.

The City holds the senior water right, established in 1909, of 2 cfs on Calapooya Creek. Water rights for instream flow are held by the State of Oregon, but these are relatively junior, having been established in 1958 and 1974. The volume of the 1958 Oregon water right is 12 cfs (measured at the mouth), while the 1974 instream flow rights vary from 10 to 100 cfs, depending on location and season. Water rights senior to Oregon's 1958 12 cfs instream flow right total 19.496 cfs. This total is divided between 55 separate rights; a similar number of Calapooya Creek water rights which are junior to Oregon's 1958 instream rights also exist.

Theoretically, withdrawals by junior water right holders are suspended when senior water rights cannot be met. As a practical matter, water right holders often do not withdraw the total volume that is legally theirs to use and/or may not make continuous diversions. It is only when senior water rights holders cannot withdraw the volume actually needed is their priority called. At this point the State of Oregon's Water Resources Department's (WRD) local watermaster regulates junior users, to allow sufficient water to reach the point of diversion of the needy senior user. An inevitable corollary of these procedures is that the watermaster will not regulate junior users upstream of a needy senior user unless all flow is used at the senior user's point of diversion; i.e., until instream flows are zero. The obvious exceptions to this corollary are that water needed to satisfy even more senior users and instream flow rights pass the point of measurement. In addition to calls by senior water right holders, the WRD can use the Oakland gage to measure flows in Calapooya Creek; the agency also takes direct measurements of streamflow near the mouth using flow meters and depth measurements (Dave Williams, Watermaster, WRD, pers. comm., Oct. 21, 1999).

In the case of Calapooya Creek, Oregon's 1958 instream flow right is measured at the mouth of the creek (creek mile 0), but with the full use of the rights of consumptive users senior to the 1958 instream flow right, no water would reach the mouth until flows above the most upstream senior right holder approach 20 cfs. Similarly, instream flow volume at the Oakland gage would need to be about 8 cfs before Calapooya Creek water would reach the Umpqua River through surface flow. This is assuming that groundwater, tributary streams, irrigation return flow, and WW treatment plants do not contribute substantial volume within the reach. At low flow levels in the mainstem, Calapooya Creek tributaries are typically reduced to isolated pools (Dave Williams, WRD, pers. comm., Oct. 21, 1999) and so do not contribute surface flow to the creek. The City of Sutherlin currently irrigates a golf course with its WW treatment plant effluent, while the City proposes to irrigate a pasture with its WW treatment plant effluent. No estimate of irrigation return flow or groundwater contribution is available, but the pastures and hayfields which are the prevalent beneficiaries of Calapooya Creek irrigation diversions typically do not benefit from over-watering.

As noted above, however, individual water right holders generally do not divert the full amount of their right continuously. As a rule of thumb, it is likely that only about one-half of the total volume of water rights are being withdrawn at any particular time during the irrigation season (Dave Williams, WRD, pers. comm., Oct. 21, 1999). Applying this approximation, then, the 12 cfs 1958 instream flow right on Calapooya Creek is likely to be met when discharge at the Oakland gage exceed about 16 cfs (the 0.5 typical use factor times 8 cfs of senior water rights between Oakland gage and mouth of creek plus 12 cfs instream flow). At discharges below about 16 cfs at the Oakland gage, flows at the mouth of Calapooya Creek would likely be reduced proportionally below 12 cfs, because about 4 cfs of rights below the gage are senior to the 1958 instream flow right. At discharges below about 4 cfs at the Oakland gage, little or no surface flow is likely to occur below the lowermost senior irrigator (at about creek mile 2.1). The above assumes little or no subsequent input from tributaries, etc., below the Oakland gage, which is likely a reasonable assumption at low flow levels. If this assumption is violated, then more water may be available for instream flows or junior irrigators (depending on the discharge). Figure 1 illustrates current Calapooya Creek instream flows at four inflow volumes, based on withdrawals as described above.

As the Calapooya Creek discharge decreases below about 4 cfs (as measured at the Oakland gage), relatively senior water rights holders would begin to be regulated. The second-most senior water right on the creek (after the City's municipal right) is an irrigation right of 0.2 cfs with a diversion point at about creek mile 2.1. So, in theory, the presence of this senior irrigator should ensure a minimal amount of surface flow to within 2.1 miles of the mouth of the creek, as long as there are a few tenths of a cfs flow in the creek after the City's needs (up to 2 cfs) are satisfied. As a practical matter, however, evaporation from the creek, evapotranspiration from riparian vegetation, and subsurface infiltration are likely to remove water from the creek channel in the intervening 12.4 miles, so the volume of water that is necessary to pass the City's diversion point (during periods of low creek flow) and still reach creek mile 2.1 is both uncertain and variable, but is very likely to be greater than the needs of the most-downstream irrigator.

b. Likely Effects of the Proposed Actions on Streamflows. The proposed WW project would eliminate the City's flow of effluent into Calapooya Creek during the dry season. While this action would stop the degradation of water quality caused by the effluent (at least during the dry season), it would also reduce water volume in the creek. Therefore, an interrelated effect of the proposed action would be that the likelihood of maintenance of surface flows in the creek (at least to creek mile 2.1) during low flow periods would be reduced. Currently, mean daily discharge of effluent into the creek during the dry season is about 74,000 gpd (0.12 cfs), so the proposed actions would reduce effluent by that amount.

Data published by the USGS for the water years 1987 through 1998 show that the mean annual minimum daily flow at the Oakland gage was only about 1.9 cfs (and was less than 1 cfs for five of those years); see Table 1. Mean discharge measured at the Oakland gage was less than 16 cfs (about the volume necessary to provide the full 1958 instream flow right) on a total of 935 days during this period (Table 1), which is more than one-half of the total number of days from June 1 through October 31 in those years (plus three days in November). The same data show that mean discharge at the gage was less than 16 cfs for 83% of the days in August and September of these years; this figure is 94% if the relatively wet water years of 1993 and 1997 are excluded. Similarly, mean discharge measured at the Oakland gage was less than 4 cfs (about the volume necessary to provide any surface flow at the mouth of Calapooya Creek) on a total of 230 days from 1987 through 1998 (also Table 1). This is about 28% of the days in August and September during this period, and 33% of the days in August and September if 1993 and 1997 are excluded.

As described above, 19.496 cfs of water rights on Calapooya Creek are senior to the 1958 instream flow right. After applying the instantaneous use multiplier to the senior irrigation and domestic rights, as well as the current net use of the City of Sutherlin's municipal rights (about 2.4 cfs), and the current net use of Calapooya Creek water by the City (about 0.31 cfs), however, it is likely that about 9.958 cfs inflow to the creek would, on average, satisfy the senior rights.

Figure 1. Calapooya Creek Instream Flow Volume at Varying Inflow Volume With Probable Withdrawals and Current City WW System

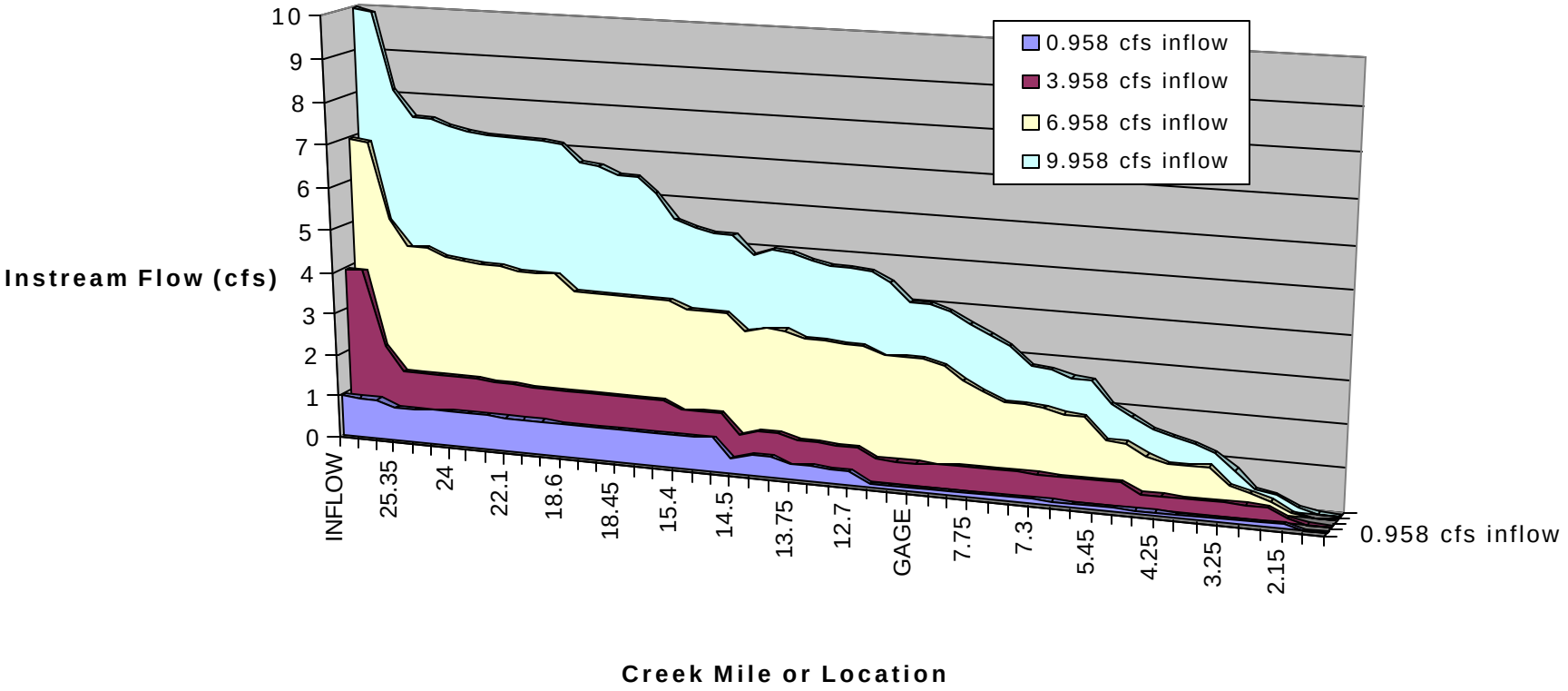


Table 1. Daily mean discharge measurements at the USGS "Oakland Gage" (14320700) on Calapooya Creek.

Water Year	*Annual Minimum (in cfs) and Date of Occurrence*	*Number of Days below 4 cfs*	*Number of Days below 16 cfs*
1987	0.55 (9/4/87)	36	90
1988	0.05 (9/8/88)	25	95
1989	2.9 (9/17/89)	11	105
1990	2.6 (9/25/90)	10	93
1991	1.5 (9/23/91)	38	77
1992	0.09 (9/4/92)	33	111
1993	5.5 (10/12/92)	0	25
1994	0 (8/17/94, 8/18/94)	49	88
1995	2.0 (9/24/95)	5	82
1996	0.89 (8/27/96)	19	63
1997	3.6 (8/14/97)	2	50
1998	3.3 (9/8/98)	2	53
Annual Mean	**1.9**	**19.2**	**77.7**

The effluent from the City's WW system currently accounts for about 0.115 cfs of the creek's dry season flow below the outfall (at about creek mile 14.1). This effluent is used for irrigation below the outfall, and if the effluent no longer enters the creek, a starting Calapooya Creek inflow of about 10.078 cfs (9.958 cfs plus 0.12 cfs) would be necessary to satisfy senior water users. Inflows to Calapooya Creek less than about 9.958 cfs would therefore require the regulation of some of the senior water rights, as would the diversion of additional water by the City or by Sutherlin. Table 2 shows the effects of senior water rights on streamflows throughout the affected reach of Calapooya Creek with the elimination of WW effluent during the dry season and as natural stream flows drop. Figure 2 illustrates the reduction in streamflows at the Oakland gage with the elimination of WW effluent during the dry season and decreasing natural flows.

As can be seen from the tables and figures, the effect of the proposed action by the City varies with the flow volume in Calapooya Creek and the location of interest. The computation of the senior water right satisfaction volume and the relevant tables and figures derived from this computation assume that the most recent published 12 years of USGS flow data are representative of future hydrologic conditions, that water within the creek channel is completely

Table 2. Regulation of water withdrawals of senior users and instream flows associated with reduction of instream flows in Calapooya Creek through elimination of effluent discharge by the City of Oakland, Oregon. Assumes stated initial flow volume to upstream-most senior user.

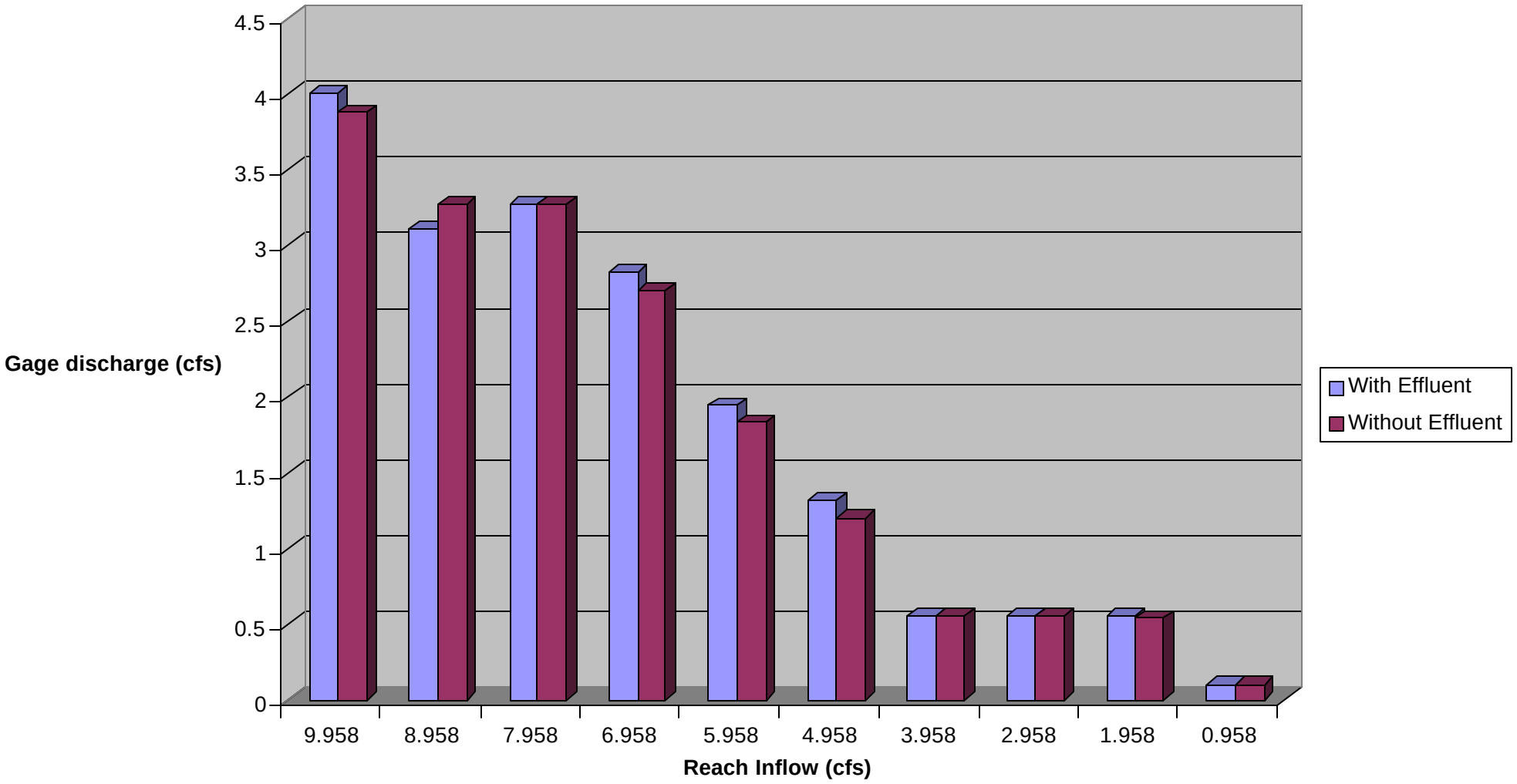
			9.958 Initial Flow Volume			6.958 Initial Flow Volume			3.958 Initial Flow Volume			0.958 Initial Flow Volume		
				Effluent Withheld *or*			**Effluent Withheld** or			**Effluent Withheld** or			**Effluent Withheld** or	
C.M.	Priority	Adjusted* Volume Withdrawn	Streamflow With Effluent	*Irrigation Diversion Regulated***	Streamflow Without Effluent	Streamflow With Effluent	*Irrigation Diversion Regulated***	Streamflow Without Effluent	Streamflow With Effluent	*Irrigation Diversion Regulated***	Streamflow Without Effluent	Streamflow With Effluent	*Irrigation Diversion Regulated***	Streamflow Without Effluent
Inflow	N/A	N/A	9.958	N/A	9.958	6.958	N/A	6.958	3.958	N/A	3.958	0.958	N/A	0.958
31	11	0.075	9.883	0	9.883	6.883	0	6.883	3.9565	*-0.075*	3.958	0.958	*-0.075*	0.958
25	9	1.8	8.083	0	8.083	5.083	0	5.083	2.1565	*-0.1085*	2.2665	0.958	*-1.8*	0.958
25	4	0.6	7.483	0	7.483	4.483	0	4.483	1.5565	0	1.6665	0.8025	*-0.5645*	0.9225
25	13	0.0215	7.4615	0	7.4615	4.4615	0	4.4615	1.5565	*-0.0215*	1.6665	0.8025	*-0.0215*	0.9225
25	13	0.1395	7.322	0	7.322	4.322	0	4.322	1.5565	*-0.1395*	1.6665	0.8025	*-0.1395*	0.9225
24	22	0.07	7.252	0	7.252	4.252	0	4.252	1.5565	*-0.07*	1.6665	0.8025	*-0.07*	0.9225
23	21	0.045	7.207	0	7.207	4.207	0	4.207	1.5565	*-0.045*	1.6665	0.8025	*-0.045*	0.9225
22	10	0.01	7.197	0	7.197	4.197	0	4.197	1.5465	*-0.01*	1.6665	0.8025	*-0.01*	0.9225
22	7	0.065	7.132	0	7.132	4.132	0	4.132	1.4815	0	1.6015	0.8025	*-0.065*	0.9225
22	7	0.025	7.107	0	7.107	4.107	0	4.107	1.4565	0	1.5765	0.8025	*-0.025*	0.9225
19	36	0.025	7.082	0	7.082	4.107	*-0.025*	4.107	1.4565	*-0.025*	1.5765	0.8025	*-0.025*	0.9225
19	19	0.365	6.717	0	6.717	3.742	0	3.742	1.4565	*-0.365*	1.5765	0.8025	*-0.365*	0.9225
19	34	0.09	6.627	0	6.627	3.742	*-0.09*	3.742	1.4565	*-0.09*	1.5765	0.8025	*-0.09*	0.9225
18	34	0.195	6.432	0	6.432	3.742	*-0.195*	3.742	1.4565	*-0.195*	1.5765	0.8025	*-0.195*	0.9225
18	19	0.005	6.427	0	6.427	3.737	0	3.737	1.4565	*-0.005*	1.5765	0.8025	*-0.005*	0.9225
17	34	0.37	6.057	0	6.057	3.737	*-0.37*	3.737	1.4565	*-0.37*	1.5765	0.8025	*-0.37*	0.9225
16	33	0.525	5.532	0	5.532	3.737	*-0.525*	3.737	1.4565	*-0.525*	1.5765	0.8025	*-0.525*	0.9225
16	1	0.43	5.102	0	5.102	3.307	0	3.307	1.0265	0	1.1465	0.3725	0	0.4925
15	8	0.199	4.903	0	4.903	3.108	0	3.108	0.8275	0	0.9475	0.3725	*-0.199*	0.4925
15	35	0.07	4.833	0	4.833	3.108	*-0.07*	3.108	0.8275	*-0.07*	0.9475	0.3725	*-0.07*	0.4925
15	28	0.005	4.828	0	4.828	3.108	*-0.005*	3.108	0.8275	*-0.005*	0.9475	0.3725	*-0.005*	0.4925
14	N/A	-0.12	4.948	**0.12**	4.828	3.228	**0.12**	3.108	0.9475	**0.12**	0.9475	0.4925	**0.12**	0.4925
14	25	0.01	4.938	0	4.818	3.218	0	3.098	0.9475	*-0.01*	0.9475	0.4925	*-0.01*	0.4925
14	3	0.146	4.792	0	4.672	3.072	0	2.952	0.8015	0	0.8015	0.3465	0	0.3465
13	30	0.065	4.727	0	4.607	3.072	*-0.065*	2.952	0.8015	*-0.065*	0.8015	0.3465	*-0.065*	0.3465
13	3	0.0315	4.6955	0	4.5755	3.0405	0	2.9205	0.77	0	0.77	0.315	0	0.315
13	32	0.04	4.6555	0	4.5355	3.0405	*-0.04*	2.9205	0.77	*-0.04*	0.77	0.315	*-0.04*	0.315
11	3	0.215	4.4405	0	4.3205	2.8255	0	2.7055	0.555	0	0.555	0.1	0	0.1
10	31	0.435	4.0055	0	3.8855	2.8255	*-0.435*	2.7055	0.555	*-0.435*	0.555	0.1	*-0.435*	0.1
9.7	26	0.115	3.8905	0	3.7705	2.7105	0	2.5905	0.555	*-0.115*	0.555	0.1	*-0.115*	0.1
8.3	17	0.25	3.6405	0	3.5205	2.4605	0	2.3405	0.555	*-0.25*	0.555	0.1	*-0.25*	0.1
7.8	23	0.245	3.3955	0	3.2755	2.2155	0	2.0955	0.555	*-0.245*	0.555	0.1	*-0.245*	0.1
7.8	15	0.1905	3.205	0	3.085	2.025	0	1.905	0.555	*-0.1905*	0.555	0.1	*-0.1905*	0.1
7.3	37	0.435	2.77	0	2.65	2.025	*-0.435*	1.905	0.555	*-0.435*	0.555	0.1	*-0.435*	0.1

C.M.	Priority	Adjusted* Volume Withdrawn	9.958 Initial Flow Volume Streamflow With Effluent	**Effluent Withheld** *or* *Irrigation Diversion Regulated***	Streamflow Without Effluent	6.958 Initial Flow Volume Streamflow With Effluent	**Effluent Withheld** or *Irrigation Diversion Regulated***	Streamflow Without Effluent	3.958 Initial Flow Volume Streamflow With Effluent	**Effluent Withheld** or *Irrigation Diversion Regulated***	Streamflow Without Effluent	0.958 Initial Flow Volume Streamflow With Effluent	**Effluent Withheld** or *Irrigation Diversion Regulated***	Streamflow Without Effluent
7.3	18	0.04	2.73	0	2.61	1.985	0	1.865	0.555	*-0.04*	0.555	0.1	*-0.04*	0.1
7.3	16	0.13	2.6	0	2.48	1.855	0	1.735	0.555	*-0.13*	0.555	0.1	*-0.13*	0.1
6.7	16	0.02	2.58	0	2.46	1.835	0	1.715	0.555	*-0.02*	0.555	0.1	*-0.02*	0.1
5.5	12	0.51	2.07	0	1.95	1.325	0	1.205	0.555	*-0.51*	0.555	0.1	*-0.51*	0.1
4.7	29	0.25	1.82	0	1.7	1.325	*-0.25*	1.205	0.555	*-0.25*	0.555	0.1	*-0.25*	0.1
4.7	5	0.235	1.585	0	1.465	1.09	0	0.97	0.32	0	0.32	0.1	*-0.235*	0.1
4.3	20	0.14	1.445	0	1.325	0.95	0	0.83	0.32	*-0.14*	0.32	0.1	*-0.14*	0.1
3.9	38	0.14	1.305	*-0.0569*	1.2419	0.95	*-0.14*	0.83	0.32	*-0.14*	0.32	0.1	*-0.14*	0.1
3.3	38	0.155	1.15	*-0.0631*	1.15	0.95	*-0.155*	0.83	0.32	*-0.155*	0.32	0.1	*-0.155*	0.1
3.3	24	0.355	0.795	0	0.795	0.595	0	0.475	0.32	*-0.355*	0.32	0.1	*-0.355*	0.1
3.3	27	0.365	0.43	0	0.43	0.43	*-0.32*	0.43	0.32	*-0.365*	0.32	0.1	*-0.365*	0.1
2.3	14	0.11	0.32	0	0.32	0.32	0	0.32	0.32	*-0.11*	0.32	0.1	*-0.11*	0.1
2.2	6	0.22	0.1	0	0.1	0.1	0	0.1	0.1	0	0.1	0.1	*-0.22*	0.1
2.1	2	0.1	0	0	0	0	0	0	0	0	0	0	0	0

* For irrigation and domestic users, volume withdrawn is water right adjusted by 035X rule of thumb; for Sutherlin and Oakland municipal rights, volume withdrawn is current late summer net use; for Oakland WW outfall, volume is current flow mean.

** For irrigation, domestic, and municipal rights, number in column is volume of reduction of use; for Oakland, number is net volume of depletion of instream flow through elimination of effluent.

Figure 2. Discharge at "Oakland" Gage With and Without Effluent and with Varying Reach Inflow Volumes



transmitted downstream unless and until diverted, that the 0.5 multiplier instantaneous use approximation (for irrigation and domestic water rights) is valid, that little or no water is added to the creek channel from tributaries, etc., downstream of the City, and that all other factors, except for the reduction in flows related to the action, remain constant. As also can be seen from the table and figure, the cessation of WW system discharge by the City causes a general decrease in instream flows equal to the amount of the current effluent volume because the regulation of junior water right holders is based on the priority date of the rights. However, because these priority rights are scattered both upstream and downstream of the City, regulation of a junior priority may cause flows to actually increase or remain static in some stream reaches.

c. Analysis of Hydrologic Effects of Proposed Actions. While it is true that flow levels in Calapooya Creek dropped to low levels prior to the inception of irrigation and municipal diversions, it is also plain that such diversions have greatly exacerbated the incidence of low flows during the summer and early fall. It is obvious from the tables and figures that the overall effect of the proposed actions would be the reduction of instream flows in some reaches of Calapooya Creek, but it is difficult to analyze the effect of the actions on the listed anadromous fish species and their habitat without some sort of objective measure. The Oakland USGS gage is the only long term and current recorded measure of instream flows on Calapooya Creek. As noted above, when flows drop below about 16 cfs at the Oakland gage, the volume of the 1958 instream flow right is typically regulated (i.e., reduced) because of demands of senior water rights holders. While the regulation of the 1958 instream flow right is likely to adversely affect aquatic life in Calapooya Creek, it is also likely that the maintenance of even a small instream flow at the mouth would maintain a substantial portion of the aquatic habitat values necessary to support individuals of the ESA-listed salmonid species.

As noted above, however, when flows drop to about 4 cfs at the Oakland gage, it is likely that no water would flow in about the lower 2.1 miles of Calapooya Creek (because of withdrawals by senior users). Clearly, the reduction of any portion of the creek to isolated pools (even for a few hours or days) would be severely detrimental to riffle organisms and habitat, while the confinement of salmonids to pools has the potential to substantially increase the risk of injury or death due to water quality changes, predation, etc. As shown in Table 1, based on the last 12 years of published data from the USGS, the instream flow at the Oakland gage is reduced to below 4.0 cfs an average of 19.2 days per year. Based on calculations in Table 2 and the USGS records, a further reduction in flow by the City (because of the elimination of effluent discharge) of about 0.12 cfs (rounded to 0.1 cfs, because the USGS data is reported to the nearest 0.1 cfs) would increase the mean number of sub-4 cfs days each year to about 19.8, which is about a 3% increase.

4. Summary of Effects.

The NMFS believes that the construction of the modifications to the WW system has the potential to adversely affect individual UR cutthroat trout, OC coho salmon, and OC steelhead through direct injury and mortality, and through effects on habitat indicators. While the general effects of flow volume

reduction on aquatic organisms—including UR cutthroat trout, OC coho salmon, and OC steelhead—are well understood, and reasonable approximations of the hydrologic effects of the proposed action can be calculated, it is difficult to predict the actual effects of the proposed action on the anadromous salmonids of Calapooya Creek because of the complexity of the system and the lack of specific data.

Concerning the proposed modifications to the City's WW system, most of the low flows in Calapooya Creek occur during August and September. Water temperature is also likely to be highest in August and September, and so DO concentrations would also likely be lowest during these two months. So, while the elimination of WW effluent would have the greatest proportional adverse effect on flow volume during August and September, it would also have the greatest proportional beneficial effect on water quality in August and September. Lacking experimental data, the NMFS suspects that the reduction in flow volume associated with the WW system modifications may be of acute adverse effect at the most extreme low flow levels, but that the improvements in water quality also associated with the proposed modifications would be of benefit over a wider variety of discharge levels. On the whole, the NMFS believes that while individuals of the ESA-listed species are likely to be adversely affected by proposed modifications to the City's WW system, the effects of the adverse and beneficial modifications to the WW system on the anadromous fish populations of Calapooya Creek are likely to be roughly equal over the long term.

B. Effects of Interrelated and Interdependent Actions

Interrelated and interdependent actions are those that would not occur but for the proposed action. The City proposes to obtain grants and loans from Rural Development to fund the proposed actions; the City's consultant estimates that the WW system improvements would cost about $2.5 million. Rural Development would provide a grant of approximately $2 million for the WW system improvement, which would allow other Federal (through the Environmental Protection Agency) and State grants and loans to finance the balance of the cost for the WW system. Because of the small size of the community (approximate population is 850) and the modest means of the majority of its inhabitants (median household income is only about 80% of the Oregon mean), it seems likely that the City would have difficulty raising funds to complete the proposed WW system improvement if Federal grants and loans were unavailable. Because of this, the NMFS considers the reductions in Calapooya Creek flow associated with the operation of the improved WW and PW systems to be interrelated and interdependent actions to the construction of the WW system improvement. The direct effects of these interrelated and interdependent actions have been analyzed above.

In addition to direct effects, it may be argued that an indirect effect of the proposed WW system improvement would be the facilitation of further development and population density in the City, and that such development has the potential to adversely affect the listed anadromous fish species in ways not analyzed in this document. The NMFS believes, however, that the principal impact of increased development and population density in the City on the listed species associated with WW treatment

facilities would be the discharge of water into Calapooya Creek, which has already been addressed. In addition, the possible relationship between the proposed actions and increased development in the City is speculative. Thus, aside from those actions already analyzed, the proposed action would not result in actions that would not otherwise occur.

C. Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." The action area for this consultation is the Calapooya Creek watershed. Future Federal actions, including land management activities, are being (or have been) reviewed through separate section 7 consultation processes. In addition, non-Federal actions that require authorization under section 10 of the ESA will be evaluated in section 7 consultations. Therefore, these actions are not considered cumulative to the proposed action. NMFS is not aware of any new future activities, or changes to existing state and private activities, within the action area that would cause greater impacts to listed species than presently occurs. NMFS assumes that future private and State actions will continue at similar intensities as in recent years.

VI. CONCLUSION

The NMFS has determined that based on the available information, funding of the City's WW system improvement by RD is not likely to jeopardize the continued existence of UR cutthroat trout or OC coho salmon or result in the destruction or adverse modification of designated or proposed critical habitat for UR cutthroat trout or OC coho salmon. NMFS used the best available scientific and commercial data to apply its jeopardy analysis (described in NMFS 1999), when analyzing the effects of the proposed action on the biological requirements of the species relative to the environmental baseline (described in NMFS 1997), together with cumulative effects. The effects of the proposed action on OC steelhead and their habitat would be similar to the effects on UR cutthroat trout and OC coho salmon.

In reaching this conclusion, NMFS determined that the survival and recovery of UR cutthroat trout and OC coho salmon would not be appreciably diminished by the proposed action. This conclusion was reached primarily because: (1) The proposed construction activities would likely cause minor, short-term decreases in water quality but the effects on essential features of anadromous salmonid habitat are expected to be negligible; (2) direct mortality, injury, or disturbance from contact with the construction equipment and materials should be rare because of the timing of the action, the small area of impact, the measures taken to prevent salmonids from coming into contact with equipment and materials, and because most individual salmonids in proximity of the activities should be aware and agile enough to avoid injury; and (3) the elimination of the flow of WW effluent during the dry season would reduce flow volume in Calapooya Creek, but should substantially improve water quality.

VII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitat, or to develop additional information. NMFS believes the following conservation recommendation is consistent with these obligations and therefore should be implemented by the COE:

1. Throughout the course of solicitation, review, and acceptance of funding projects, RD should specifically encourage the City and other entities to develop plans, techniques, and options for the projects which would minimize the effects of the proposed actions on ESA-listed salmonid habitat, and if possible, to enhance such habitat in the development of the projects.

2. RD should partially base its selection of projects to be funded on the ability of those projects to minimize the effects of the proposed actions on ESA-listed salmonid habitat, and if possible, to enhance such habitat in the development of the projects.

3. RD should, to the extent of its discretion, attempt to ensure that all instream flow rights transferred by the City be measured by WRD at the mouth of Calapooya Creek. Also, if the instream flow rights transferred by the City to the WRD share priority dates with other water rights and streamflows require the regulation by the WRD of the instream flow right and other water rights of the same priority date, RD should, to the extent of its discretion, attempt to ensure that the instream flow rights shall not be regulated by the WRD in greater proportion than contemporary consumptive rights.

VIII. REINITIATION OF CONSULTATION

Based on the information provided, NMFS anticipates that an unquantifiable amount of incidental take could occur as a result of the actions covered by this Biological Opinion. To ensure protection for a species assigned an unquantifiable level of take, reinitiation of consultation is required if: (1) Any action is modified in a way that causes an effect on the listed species that was not previously considered in the information provided and this Biological Opinion; (2) new information or project monitoring reveals effects of the action that may affect the listed species in a way not previously considered; or (3) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

IX. REFERENCES

Section 7(a)(2) of the ESA requires biological opinions to be based on "the best scientific and commercial data available." This section identifies the data used in developing this opinion, in addition to the BA.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. American Fisheries Society Special Publication 19:83-138.

Busby, P.J., T.C. Wainright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of West Coast steelhead from Washington, Idaho, Oregon, and California. National Marine Fisheries Service, Coastal Zone and Estuarine Studies Division, Seattle, Washington and Protected Species Management Division, Long Beach, California.

Johnson, O.W., R.S. Waples, T.C. Wainwright, K.G. Neely, F. W. Waknitz, and L. T. Parker. 1994. Status review of Oregon's Umpqua River sea-run cutthroat trout. National Marine Fisheries Service, Coastal Zone and Estuarine Studies Division, Seattle, Washington.

NMFS (National Marine Fisheries Service). 1997. Biological requirements and status under 1996 environmental baseline: Umpqua River cutthroat trout, Oregon Coast coho salmon, Oregon Coast steelhead, Southern Oregon/Northern California coho salmon, Klamath Mountain Province steelhead, Lower Columbia steelhead, and chum salmon. NMFS, Northwest Region, Seattle, Washington. September 1997.

NMFS (National Marine Fisheries Service). 1999. The habitat approach: implementation of Section 7 of the Endangered Species Act for actions affecting the habitat of Pacific anadromous salmonids. NMFS, Northwest Region, Habitat Conservation and Protected Resources Divisions, Portland, Oregon. August 1999.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon.

Trotter, P.C. 1987. Cutthroat: native trout of the West. Colorado Associated University Press, Boulder.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R.S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington.

X. INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement. This ITS does not apply to OC steelhead as this species does not have status under the ESA. Furthermore, NMFS does not expect this species to become listed before the proposed action is completed.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

A. Amount or Extent of the Take

The NMFS anticipates that the action covered by this Biological Opinion—funding for the construction of an upgraded WW system for the City of Oakland, Oregon—has more than a negligible likelihood of resulting in incidental take of UR cutthroat or OC coho salmon because of the potential for direct incidental take during construction or because of reductions in instream flow volume. Effects of actions such as these are largely unquantifiable in the short term, and are not expected to be measurable as long-term effects on the species' habitat or population levels. Therefore, even though NMFS expects some low level incidental take to occur due to the actions covered by this Biological Opinion, the best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take to the species itself. In instances such as these, the NMFS designates the expected level of take as unquantifiable. Based on the information provided, NMFS anticipates that an unquantifiable amount of incidental take could occur as a result of the actions covered by this Biological Opinion. The adverse effects of the actions, however, should be confined to the Calapooya Creek watershed.

B. Reasonable and Prudent Measures

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimize the take of listed and proposed species and/or to minimize the adverse modification of designated or proposed critical habitat:

1. RD shall ensure that the potential for direct incidental take of UR cutthroat trout and OC coho salmon and damage to these species' instream and riparian habitat associated with the construction of the proposed WW system (turbidity and sedimentation, vegetation clearing, in-water operation of heavy equipment, coffer damming, blasting, etc) is minimized.

2. RD shall ensure that instream flow volume in Calapooya Creek is protected.

C. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, RD must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1a. Minimization/avoidance measures listed in Attachment 1 for in-water work, erosion control, hazardous materials, riparian impacts, and monitoring shall be implemented for the proposed action in accordance with the terms and objectives of Attachment 1. Although Attachment 1 specifically deals with road-construction and maintenance activities of the Oregon Department of Transportation, the measures, terms, and objectives are directly applicable to the proposed action.

1b. All work within the active flowing channel (in-water work) shall occur between July 1 and October 31.

1c. Extensive in-water excavation (including any explosive bedrock excavation) shall be isolated from the active channel by means of a cofferdam or other structure. Fish passage around cofferdams shall be maintained at all times.

1d. Woody riparian vegetation at the project site shall be replaced to the maximum extent horticulturally possible and maintained for at least 5 years.

1e. Any stranding, injury, or mortality to salmonids observed by the City or its contractors as a result of construction or operation of the WW system shall be reported to the NMFS' Roseburg Field Office within 7 days.

In addition, the City shall freeze or preserve (in 70% isopropyl alcohol) the carcasses of any salmonids discovered during construction or operation of the WW system to allow species identification by the Roseburg Field Office. Close-up photos of salmonid carcasses that permit species identification may be substituted for the frozen or preserved carcasses.

2a. RD shall ensure, through grant and/or loan contracts or other documentation, that the City officially transfers (through the WRD) to instream flow rights the irrigation water rights associated with the property to be purchased for effluent irrigation as mitigation for the elimination of WW system effluent. At least 0.058 cfs of the transferred irrigation water rights shall have a priority date no later than April 20, 1923. If at least 0.058 cfs of irrigation flow rights (with a priority date no later than April 20, 1923) associated with the effluent irrigation property cannot be transferred by the City to instream flow rights, RD shall ensure that the City officially transfers other irrigation water rights (with a priority date no later than April 20, 1923) or a portion of its municipal water right sufficient to total at least 0.058 cfs of new instream flow rights. RD shall submit documentation to the NMFS and ODFW demonstrating application for the transference of the instream flow rights within 30 days of the first transfer of funds from RD to the City. RD shall submit documentation to the NMFS and ODFW demonstrating the transference of the instream flow rights within one year of the first transfer of funds from RD to the City.

ATTACHMENT 1

General Minimization and Avoidance Measures

Road Construction

In-water Work

- Passage shall be provided for both adult and juvenile forms of all salmonid species throughout the construction period. ODOT designs will ensure passage of fishes as per ORS 498.268 and ORS 509.605.

C All work within the active channel of all anadromous fish-bearing systems, or in systems which could potentially contribute sediment or toxicants to downstream fish-bearing systems, will be completed within ODFW's in-water work period. This in-water work period varies by system.[1] Any extensions of the in-water work period will first be approved by and coordinated with ODFW.

C During ODOT project design, ODOT will work to minimize the amount of riprap used. In unshaded areas above the 5-year floodplain which are not scour-critical, ODOT will attempt to use biological bank control, or to backfill with native soil and plant with willow and other riparian species. This installation will increase riparian shading and cover. Where riprap is necessary, only clean, non-erodible, upland angular rock of sufficient size for long-term bank armoring will be employed.

C Alteration or disturbance of stream banks and existing riparian vegetation will be minimized. Where bank work is necessary, bank protection material shall be placed to maintain normal waterway configuration. Waterway bank slopes will be left no steeper than 1:2.

C In areas with riprap installation, larger riprap (class 350 metric minimum) will be used preferentially within the 2-year floodplain of systems, where this riprap would come into contact with actively flowing water, and where using larger riprap would not constrict the size of the active channel (larger rock sizes create larger interstitial spaces for juvenile salmonids). Placement will be performed "in the dry" as much as possible, and from the top of the bank where possible. Riprap areas will be planted with willow stakes (and other riparian shrubs/ tress) to increase shading and cover within the 1 0-year floodplain, where appropriate. Willow stakings will be of a species appropriate for the physiographic province and will be planted at an approximate density of 2000/ ha (generally).

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[1]Many non-estuarine systems have an in-water work period during the driest portions of the year.

Erosion Control

For all projects with the potential to contribute sediment to aquatic resources, an Erosion Control Plan (ECP) will be prepared by ODOT's Erosion Control Team and implemented by the Contractor. The ECP will outline how and to what specifications various erosion control devices will be installed to meet water quality standards, and will provide a specific inspection protocol and time response. Erosion control measures will be sufficient to ensure that turbidity does not exceed 10% above ambient (background) conditions.

- Erosion Control measures shall include (but not be limited to) the following:
  - Sediment detention measures such as placement of weed-free straw bales and silt fences at the bottom of newly-constructed slopes.
  - Construction of sediment settling basins where appropriate. Berms shall be constructed where appropriate, to divert runoff into these basins.
  - Temporary plastic sheeting for immediate protection of open areas (where seeding/ mulching are not appropriate).
  - Erosion control blankets or heavy duty matting (e.g., jute) may be used on steep unstable slopes.
  - Sills or barriers may be placed in drainage ditches along cut slopes and on steep grades to trap sediment and prevent scouring of the ditches. The barriers will be constructed from rock and straw bales.
  - Biobags, weed-free straw bales and loose straw may be used for temporary erosion control. Temporary erosion and sediment controls will be used on all exposed slopes during any hiatus in work on exposed slopes.
- Effective erosion control measures shall be in-place at all times during the contract. Construction within the 5-year floodplain will not begin until all temporary erosion controls (e.g., straw bales, silt fences) are in-place, downslope of project activities within the riparian area. Erosion control structures will be maintained throughout the life of the contract.
- All temporarily-exposed areas will be seeded and mulched. Erosion control seeding and mulching, and placement of erosion control blankets and mats (if applicable) will be completed on all areas of bare soil within 7 days of exposure within 30 meters of waterways, wetlands or other sensitive areas, and in all areas during the wet season (after October 1). All other areas will be stabilized within 14 days of exposure. Efforts will be made to cover exposed areas as soon as possible after exposure.

- All erosion control devices will be inspected during construction to ensure that they are working adequately. Erosion control devices will be inspected daily during the rainy season, weekly during the dry season, monthly on inactive sites. Work crews will be mobilized to make immediate repairs to the erosion controls, or to install erosion controls during working and off-hours. Should a control measure not function effectively, the control measure will be immediately repaired or replaced. Additional controls will be installed as necessary.

- If soil erosion and sediment resulting from construction activities is not effectively controlled, the Engineer will limit the amount of disturbed area to that which can be adequately controlled.

- Sediment will be removed from sediment controls once it has reached 1/3 of the exposed height of the control. Whenever straw bales are used, they will be staked and dug into the ground 12 cm. Catch basins shall be maintained so that no more than 15 cm of sediment depth accumulates within traps or sumps.

- Where feasible, sediment-laden water created by construction activity shall be filtered before it leaves the right-of-way or enters an aquatic resource area. Silt fences or other detention methods will be installed as close as possible to culvert outlets to reduce the amount of sediment entering aquatic systems.

- A supply of erosion control materials (e.g., straw bales and clean straw mulch) will be kept on hand to cover small sites that may become bare and to respond to sediment emergencies.

- All equipment that is used for instream work will be cleaned prior to entering the two-year floodplain. External oil and grease will be removed, along with dirt and mud. Untreated wash and rinse water will not be discharged into streams and rivers without adequate treatment.

- On cut slopes steeper than 1:2 a tackified seed mulch will be used so that the seed does not wash away before germination and rooting occurs. In steep locations, a hydro-mulch will be applied at 1.5 times the rate.

- Material removed during excavation shall only be placed in locations where it cannot enter sensitive aquatic resources. Conservation of topsoil (removal, storage and reuse) will be employed.

- Measures will be taken to prevent construction debris from falling into any aquatic resource. Any material that falls into a stream during construction operations will be removed in a manner that has a minimum impact on the streambed and water quality.

Hazmat

- ODOT actions will follow all provisions of the Clean Water Act (40 CFR Subchapter D) and DEQ's provisions for maintenance of water quality standards not to be exceeded within the Rogue Basin (OAR Chapter 340, Division 41). Toxic substances shall not be introduced above natural background levels in waters of the state in amounts which may be harmful to aquatic life. Any turbidity caused by this project shall not exceed DEQ water quality standards.

- The Contractor will develop an adequate, site-specific Spill Prevention and Countermeasure or Pollution Control Plan (PCP), and is responsible for containment and removal of any toxicants released. The Contractor will be monitored by the ODOT Engineer to ensure compliance with this PCP. Sediment releases greater than 10% above background levels will not be acceptable. No toxicants. including green concrete will be allowed to enter any aquatic resource.

- No toxicant (including petroleum products) will be stored or transferred within 50 m (165 feet) of any waterbody. Areas for fuel storage, refueling and servicing of construction equipment and vehicles will be located at least 50 m away from any waterbody.

- Hazmat booms will be installed in all aquatic systems where:

  a) Significant in-water work will occur, or where significant work occurs within the 5-year floodplain of the system, or where sediment/toxicant spills are possible.

  b) The aquatic system can support a boom setup (i.e. the creek is large enough, low-moderate gradient).

  c) A significant aquatic resource occurs downstream or within the project area.[2]

- Hazmat booms will be maintained on-site in locations where "Diapering" of vehicles to catch any toxicants (oils, greases, brake fluid) will be mandated when the vehicles have any potential to contribute toxic materials into aquatic systems.

- No surface application of nitrogen fertilizer will be used within 15.2 meters (50 feet) of any aquatic resource.

[2]Significant aquatic resources may include estuaries, spawning areas, or rearing areas.

Riparian issues

- Where appropriate, boundaries of the clearing limits will be flagged by the project inspector of ODOT. Ground will not be disturbed beyond the flagged boundary.

- Alteration of native vegetation will be minimized. Where possible, native vegetation will be clipped by hand so that roots are left intact. This will reduce erosion while still allowing room to work. No protection will be made of invasive exotic species (e.g. Himalayan blackberry)

- All exposed areas greater than 100 m^2 within the riparian corridor will have a replanting plan which is appropriate for the local overstory/understory plant community. The replanting plan will emphasize endemic riparian species.

- Riparian overstory vegetation removed will have a replacement rate of l.5:1. Replacement will occur within the project vicinity where possible and within the watershed at a minimum.

- ODOT will require a contract grow period for all riparian mitigation plantings. In extremely unstable or unproductive areas, ODOT may release the Contractor from the contract grow period and develop a larger replanting area to compensate for this.

Monitoring

- All significant riparian replant areas, streambank and channel restoration/enhancement actions, and off-channel mitigation sites will be monitored to insure the following:

    a) Finished grade slopes and elevations will perform the appropriate role for which they were designed.

    b) Log and rock structures are placed appropriately and adequately secured.

    c) Plantings are performed correctly and have an adequate success rate.

- Mitigation site monitoring will ensure that mitigation commitments have an adequate success rate to replace the functions they were designed to replace. ODOT Biology staff will produce post-construction and biannual reports on success of mitigation sites, available on request.

- Failed plantings and structures will be replaced, if replacement would potentially succeed. In cases of failed design, mitigation will generally be sought on another project, in a more appropriate location.

- ODOT will require a contract grow period for all riparian mitigation plantings. In extremely unstable or unproductive areas, ODOT may release the contractor from the contract grow period and develop a larger replanting area to compensate for this.